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Schwannoma of the hard palate: A case report and a systematic review of literature

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ABSTRACT

Schwannomas are relatively slow-growing benign tumors of the nerve sheath. Schwannomas are relatively rare in occurrence. The head and neck region is the least affected site. The clinical features of intraoral schwannoma are not adequately tackled in the literature. The paper underpins the literature for similar cases. This manuscript reports also a rare case of a palatal schwannoma in a 33-year-old female and reviews the challenges of diagnosis and prognosis of hard palate schwannoma.

1. Introduction

Schwannoma, or neurilemmoma, is a benign tumor originating from differentiated or neoplastic Schwann cells [1,2]. Being the least common intraoral neoplasm of neural origin, intraoral schwannoma (IOSW) is not commonly seen in the hard palate. IOSWs are encountered at any age but are most commonly observed in the third and fourth decades of life. Rare as they seem to be, extracranial schwannomas reveal diverse histologic phenotypes on affecting the oral and paraoral structure —causing a diagnostic dilemma [2–6]. IOSWs may show several phenotypes, including conventional, plexiform, ancient and cellular histologic variants [5–8]. Unlike neurofibroma and neuromas, syndromic association has been rarely linked to IOSWs. Given that IOSWs arise from the branches of the trigeminal nerve and autonomic nervous system, it may be noteworthy that schwannomas of oral and paraoral structures are frequently observed in intraglandular topographic sites. These sites correlate to minor and major salivary glands [7–10]. This paper aims at reviewing the literature on previously reported cases of hard palate schwannomas and at inveti-gating any possible connection, should there be a glandular element in the reviewed photomicrographs, that might suggest a glandualr etiopathology.

2. Case presentation

A 33-year-old female developed a slowly growing palatal swelling. Although the onset of this swelling could not be exactly defined, the patient stressed the persistence of this lesion, at least, for two years. The patient was medically free from serious and chronic diseases and she did not report a history of smoking or alcohol consumption. No genetic or syndromic abnormalities were identified in her family. The hard palate swelling was initially asymptomatic. Her lab investigations were unremarkable. However, the patient has recently experienced discomfort during mastication. On intra-oral examination, a single swelling on the right posterior palatal region, approximately $2 \times 3 \times 2$ cm in size, with defined borders was noticed. The overlying mucosa was normal in color and texture. Neither ulceration nor discharge could be observed. The swelling was firm in consistency. Aspirating it turned negative. The related molars were sound (Fig. 1). The radiological examinations, orthopantomographic and occlusal views, were negative for any significant bone resorption or saucerization.

Based on the clinico-radiological findings, the differential diagnosis included benign salivary gland tumors, mucoepidermoid carcinoma and lipoma. Surgical excision of the lesion was

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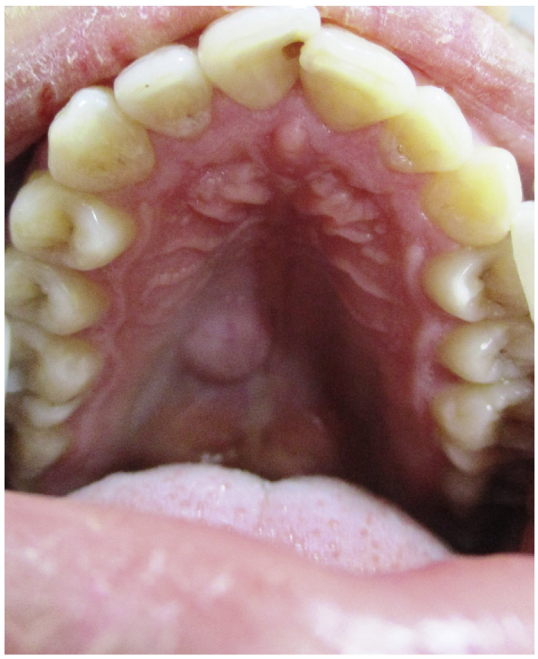

Fig. 1. Clinical appearance of the swelling on the right posterior palatal region.

performed under local ring-block anesthesia (1.2 ml Lidocaine with a vasoconstrictor). The gross specimen appeared pinkish white. The excisional biopsy was immersed immediately in 10% formalin and was sent for microscopic examination.

Histopathologic haematoxylin and eosin examination revealed numerous slender spindle shaped cells, arranged in biphasic tissue architecture. There, areas of hypercellularity as well as areas of relative hypocellularity were appreciated. The hypercellular area demonstrated numerous broad interlacing ribbons of extended spindle cells with elongated nuclei arranged in waves. Occasional nuclear palisading and Verocay body formation were conspicuous—Antoni A pattern (Fig. 2). However, the hypocellular areas demonstrated abundant acellular material punctuated by bland cigar-shaped nuclei (Antoni B architecture). The arrangement of Antoni B displayed, partly, a fibromyxoid stroma, microcystic degenerative changes and several xanthoma cells (Fig. 3). Nonetheless, there were no reticular formations, lymphoid aggregations, peripheral entrapped ducts or cytological atypia. Mitotic figures and necrosis were also absent. The immunohistochemical staining for S-100 revealed a strong immunopositivity. However, staining

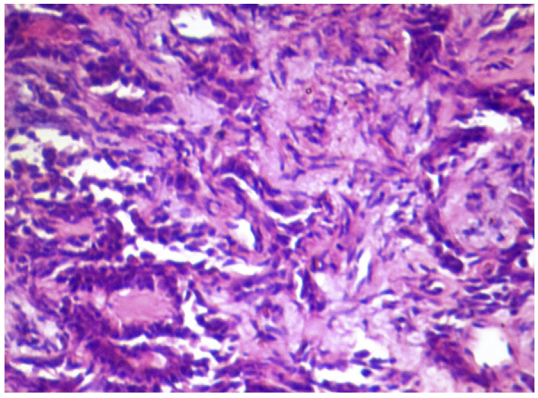

Fig. 2. Photomicrograph demonstrating nuclear palisading and Verocay bodies formation were conspicuous—Antoni A pattern.

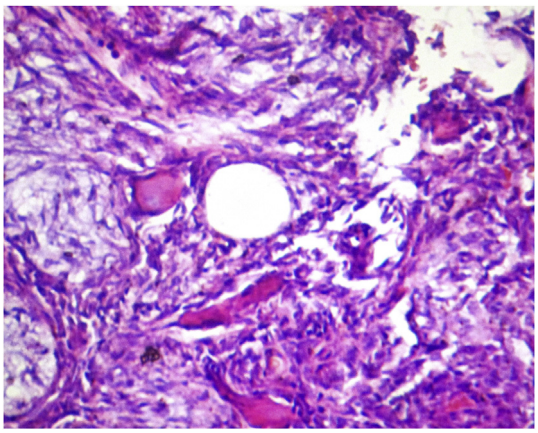

Fig. 3. Photomicrograph displaying a fibromyxoid stroma, microcystic degenerative changes and several xanthoma cells.

for neurofilament protein was negative. The case was signed out as a benign palatal schwannoma.

3. Methodology

A review of medical literature of palatal schwannomas/neurilemmomas, including all published reports, was conducted. No chronological settings or certain language were specified. Scopus*,[1] Google Scholar, PubMed and SciELO were searched. The search Medical Subject Headings, MeSH, included “palate,” AND “schwannoma,” AND/OR “neurilemoma”, AND/OR “neurilemmoma” AND “hard” AND/OR “intraoral” MINUS “soft palate”, “Tongue”, “vestibule” and other intraoral anatomical locations. Synonymous terms were included. Clinical parameters, radiographic findings, histopathologic observations and treatment modalities were charted.

Indicated statistical tests were calculated to measure the statistical significance level. The significance level was considered significant when p-value < 0.05.

4. Results

The search resulted in 59 articles of which 39 articles were accepted [1,11–49]. Fourteen articles reported IOSWs of the soft palate. Four manuscripts were review papers whose cases were previously recorded. Two hard palate IOSWs could not be retrieved. Their citation information was available with no accessibility to the original paper. From the included articles, clinical, histologic and radiological findings were charted (Table 1).

All the submitted articles agreed on the rarity of incidence of IOSWs. However, none of them has reported an accurate number of such a rare lesion. No research papers have tackled the etiopathogenesis or the preference of ISWO to be encountered in the tongue and palate. Of the compiled cases, the mean age was 31.0698 (Range = 3–79, SD = 18.215). Most of patients could not determine precisely the date of onset. So, approximate values were given as regards the lesional age. There, the mean duration was 30.2 months (Range = 3–240, SD = 48.7). IOSW of the hard palate ($IOSW_{HP}$) showed a slight predilection to females. Male to female ration was approximately 1: 1.7. However, Pearson correlation coefficient

[1] The used SCOPUS string to retrieve the relevant articles systematically is (TITLE-ABS-KEY (schwannoma)) AND (neurilemoma) AND (intraoral) OR (palate) AND (LIMIT-TO (SUBJAREA , "MEDI") OR LIMIT-TO (SUBJAREA , "DENT").

Table 1
Review of previously reported palatal schwannomas.

Case	Authors	Age	G	SITE	Size (cm)	Duration (months)	Variant	Year	Country	Ref
Benign cases										
1	Hatziotis and coll.	39	F	JP	1 × 1	84	CV	1967	Greece	[11]
2	Hatziotis and coll.	12	F	PP	0.5 × 0.5	10	CV	1967	Greece	[11]
3	Hatziotis and coll.	19	M	PP	1 × 1	24	CV	1967	Greece	[11]
5	Chen and coll.	28	F	PP	NI	NI	CV	1979	USA	[12]
6	Kitamura and coll.	12	M	PLP	1 × 2	NI	CV	1987	India	[13]
7	Jones and coll.	29	F	JP	2.5 × 2	24	CV	1987	UK	[14]
8	Hieda and coll.	44	M	NI	1.5 × 1.2	4	CV	1987	Japan	[15]
9	Yamada	40	M	PRP	2.7 × 2.2	32	CV	1989	Japan	[16]
10	Chiapasco and coll.	36	F	PRP	2 × 2	3	CV	1991	Italy	[17]
11	Krolls and coll.	21	M	PP	NI	12	CV	1994	USA	[18]
12	Amir and coll.	40	M	ENTIRE	4 × 5	3	PLX	2002	USA	[19]
13	Rabbels and coll.	11	F	PRP	1 × 2	3	CV	2005	India	[20]
14	López-Carriches and coll.	15	M	NI	1 × 1.5	3	CV	2009	Spain	[21]
15	Murthy and coll.	28	F	PLP	1.5 × 15	4	CV	2009	India	[22]
16	*Lollar and coll.*	33	M	MP	2 × 2	3	CV	2010	Japan	[23]
17	de Andrade Santos and coll.	41	F	PRP	3 × 1	60	CV	2010	Brazil	[24]
18	de Andrade Santos and coll.	53	F	PP	1 × 3	6	CV	2010	Brazil	[24]
19	Isildak and coll.	45	F	PLP	2 × 4	180	NFLA	2010	Turkey	[25]
20	Parikh and coll.	64	F	ANTP	2 × 2	36	Cellular	2010	India	[26]
21	dos Santo and coll.	3	F	PRP	1 × 1.6	6	PLX	2011	Brazil	[27]
22	Dhupar and coll.	10	M	PLP	2 × 3	5	PLX	2011	India	[28]
23	Kumar and coll.	18	M	PLP	3 × 2.5	22	CV	2012	India	[29]
24	Shetty and coll.	70	F	RPP	1 × 2	24	CV	2012	India	[30]
25	Handschel and coll.	32	M	PRP	1 × 2	24	PLX	2012	Germany	[1]
26	Agrawal and coll.	14	M	PP	1.5 × 1	12	CV	2013	India	[31]
27	Sanchis and coll.	20	F	NLA	3 × 1	10	CV	2013	Spain	[32]
28	Chikhale and coll.	24	F	PLP	2 × 2	NI	CV	2013	India	[33]
29	Gainza- Craqui and coll.	35	F	PLP	2 × 1.5	60	PLX	2013	Spain	[34]
30	Tibbetts and coll.	11	F	PRP	2 × 3	12	CV	2014	USA	[35]
31	Couto and coll.	14	F	PP	1 × 3	NI	Ancient	2014	Brazil	[36]
32	Khiavi and coll.	21	M	JP	2 × 2	NI	CV	2014	India	[37]
33	Sahoo and coll.	28	M	PP	3 × 3	48	CV	2014	India	[38]
34	Parhar and coll.	34	F	PLP	2 × 1.5	12	CV	2014	India	[39]
35	Aboh and coll.	44	F	PLP	4 × 3	240	CV	2014	Italy	[40]
36	Tippu and coll.	61	M	PRP	2 × 1.6	36	CV	2014	India	[41]
37	Shivam and coll.	28	F	PLP	1.5 × 1.5	4	CV	2014	India	[42]
38	De Faria and coll.	26	M	PP	2 × 2	NI	CV	2015	Brazil	[43]
39	Devi and coll.	19	F	PP	4 × 3	24	CV	2015	India	[44]
40	Morgan and coll.	16	F	ANTP	2 × 3	12	CV	2015	India	[45]
41	Eroglu and coll.	29	M	PRP	2 × 2	NI	CV	2017	Turkey	[46]
42	**Present case**	33	F	PRP	2 × 3	28	CV to NFLA	2017	Egypt	
Malignant reported cases										
1	Shirasuna and coll.	76	F	ENTIRE	5 × 4.5	8	Sarcomatous	1986	Japan	[47]
2	Grätz and coll.	79	F	PLP	NI	NI	Sarcomatous	1991	Switzerland	[48]
3	DiCerbo and coll.	13	F	MP	1 × 1.5	3	Sarcomatous	1992	USA	[49]

Abbreviations: **AntP**: Anterior palate; **CV**: Conventional subtype; **F**: Female; **JP**: Juncture between hard and soft palate; **M**: Male; **MP**: Midpalate; **NFLA**: Neurofibroma-like area; **NI**: Not informed; **PLP**: Posterior left palate; **PLX**: Plexiform subtype; **PRP**: Posterior right palate.

showed a weak positive correlation between age and gender ($r = 0.175$). However, the correlation was statistically significant (p-value < 0.05). Malignant $IOSW_{HP}$ was strongly correlated to old ages. Interestingly, all the published cases of $IOSW_{HP}$ are reported from twelve countries worldwide (Fig. 4). $IOSW_{HP}$ are usually of a medium size and they rarely reach a grotesque size. Most of the case reports have recorded the width and length dimensions of the lesion but the depth is rarely mentioned. Bone resorption or saucerization of the underlying bone was exceedingly rare. This explains the negative radiological picture of $IOSW_{HP}$ on the orthopantomographic and occlusal views.

The corresponding p-value of One-Way ANOVA calculated between the clinical variables was less than 0.05. Post-hoc Tukey HSD tests revealed a statistical significance on comparing age versus gender (p-value = 0.0010053). Similarly, comparing the reported age of cases of $IOSW_{HP}$ to the age of their lesions duration was statistically significant (p-value = 0.0.0048131).

Histologically, there were 40 benign cases of $IOSW_{HP}$ [1,11–46] while malignancy was reported thrice [47–49]. Of the benign lesions, the conventional phenotype, where Verocay bodies exist and areas of Antoni A is greater than Antoni B, was dominant. This histologic subtype was followed by the plexiform variant (30 and 5 cases respectively). Table 2 summarizes the clinicopathlogical features of the reviewed cases of $IOSW_{HP}$. Histologic features, such as hyalinization, necrosis, vascularity could not have been traced because several reports have clipped the histologic presentation of the submitted case(s). Isildak et al. [25] have reported a case of $IOSW_{HP}$ where neurofibroma-like areas were predominant. Gainza Cirauqui et al. [34] have reported a case of ancient schwannoma. Although this designation denotes long-standing schwannomas where areas of myxoid changes and microcytic degeneration developed, this subclassification is not applauded among pathologists. Unlike nasal schwannomas, $IOSW_{HP}$ in the midline did not show a predilection for the cellular subtype [18,23]. However, clinical behavior of $IOSW_{HP}$ did not vary according to the diverse subtypes of schwannoma.

The immunohistochemical profile was not drawn with certainty because of the paucity of the available information. Therefore, the

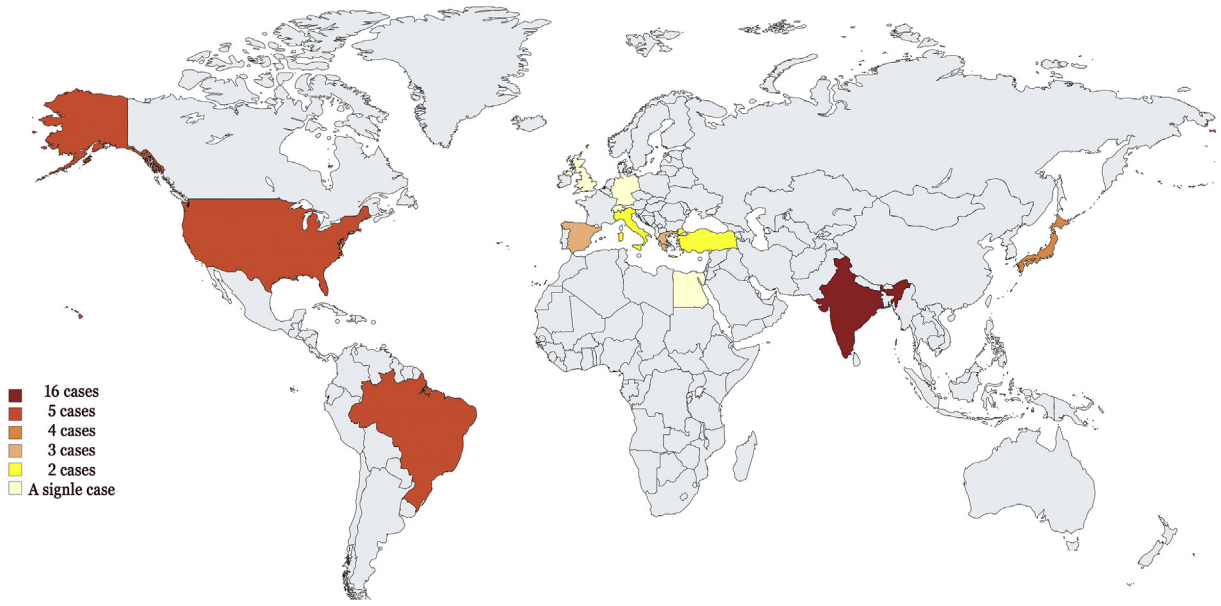

Fig. 4. Demographic distribution of the reported cases of IOSWs worldwide.

Table 2
Updated clinicopathological profile of cases of $ISWO_{HP}$.

Parameters		No.	Percentage		*p*-value
Age					
	0–9	**1**	2%	(1F)	Significant
	10–19	**13**	30%	(7F – 6M)	
	20–29	**11**	25%	(6F – 5M)	
	30–39	**7**	16%	(5F – 2M)	
	40–49	**6**	14%	(3F – 3M)	
	50–59	**1**	2%	(1F)	
	60–69	**2**	5%	(1F – 1M)	
	70–79	**3**	7%	(3F)	
Gender					
	Male	**17**	39%		Significant
	Female	**27**	61%		
	Not given	**1**	2%		
Site					
	Anterior palate	**2**	5%		Insignificant
	Posterior right palate	**10**	23%		
	Posterior left palate	**11**	25%		
	entire palate	**4**	9%		
	Juncture between hard and soft palate	**2**	5%		
	Not given	**6**	14%		
Size (in centimeter)					
	<2 in greater dimension	**12**	27%		Insignificant
	<4 in greater dimension	**22**	50%		
	>4 in any dimension	**5**	11%		
	Not given	**6**	14%		
Duration (in months)					
	0–40	**30**	68%		Significant
	40–80	**3**	7%		
	80–120	**1**	2%		
	>120	**2**	5%		
	Not given	**9**	20%		
Histology					
Benign	Conventional	**34**	77%		Insignificant
	Plexiform	**5**	11%		
	Cellular	**1**	2%		
	Melanotic	**0**	0%		
	Others	**2**	5%		
Malignant		**3**	7%		

exact, or even suggested, mechanisms of differentiating $IOSW_{HP}$ into several phenotype could not have been investigated. Reported malignant cases of $IOSW_{HP}$ were too few to suggest any statistical correlations.

Differential diagnosis included mostly minor salivary gland tumors and, in few reports, lipoma. For management and treatment,

all lesions were treated by simple surgical excision, either with or without running an incisional biopsy earlier, except for a single case. This case was treated by *en bloc* resection [15]. Malignant cases were treated by surgical excision and radiotherapy. However, distant metastases were reported in a short interval after excising the lesion. The malignant lesions were seen in three geriatric patients [47–49].

5. Discussion

Cases of IOSW have been reviewed in several studies [1,7,21,24,29,33]; however, none of them have conducted a review of all published cases rigorously. This study aimed at underpinning all the reported cases of $IOSW_{HP}$ because statistics of IOSW should be revisited. Handschel et al. [1] and Salehinejad et al. [7] have reviewed IOSW in the medical literature to conclude that oral tongue and vestibule are the most affected intraoral sites. Our study reviews 44 benign cases of $IOSW_{HP}$. This number should promote reconsidering the predilection of IOSW.

The exported clinical picture about IOSW suggested its preference to the tongue of middle aged individuals with no sex predilection [6,13,18,23,31,33,34]. However, there is a slight predilection of $IOSW_{HP}$ to females. Fifty-five percent of $IOSW_{HP}$ cases occurred in the second and third decades of life. Fifty percent of cases are of medium size (2–4 cm in the lesional greatest dimension).

Histologically, 77% of cases displayed the conventional subtype where Antoni A, Antoni B, Verocay bodies, microcystic degeneration and myxoid changes were conspicuous in diverse quantities. However, the striking predilection of $IOSW_{HP}$ to the conventional subtype could not be confirmed given the paucity and absence of low-power-magnification photomicrographs in the majority of the published reports. Schwannomas have been observed, with characteristic phenotypes, in the cheek [50]. Yet, this has never been reported in the underpinned intraoral cases. Malignancy was rarely recorded (7% of all $IOSW_{HP}$). The differential diagnosis includes classically benign salivary gland tumors and lipoma. Simple surgical excision is the mainstay treatment for managing $IOSW_{HP}$.

The presented case showed an atypical phenotype that was not in agreement with that in the reviewed literature. The histologic picture demonstrated areas that recapitulate the appearance of neurofibroma and other areas that displayed myxoid changes and microcytic degeneration, along with typical Verocay bodies. The systematic review has tabulated the exact clinico-pathological profile of $IOSW_{HP}$. The diverse histologic phenotypes have not been tethered to any atypical clinical behavior. Most patients did seek medical intervention because of the evinced difficulty in chewing and swallowing.

6. Conclusion

Underpinning medical literature, palatal schwannomas are concluded to be as frequent as tongue and gnathic (intraoseous) ones. $IOSW_{HP}$ prefers females slightly greater than males and is usually of an average size. Although conventional phenotype is the commonest in $IOSW_{HP}$, several phenotypes can be demonstrated in long-standing lesions without affecting the clinical course.

Conflicts of interest

The author declares that there is no conflict of interest.

Funding sources

None.

Ethical approval

Not required.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent was sent to the Editor-in-Chief of this journal.

Acknowledgments

None.

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